SBC Ameritech Illinois

Report on Analysis of Pre-Order Maintenance Requirements and Synchronization of Pre-Order and Order Hours of Availability

February 26, 2001

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1 Executive Summary

On January 24, 2001, the Illinois Commerce Commission (ICC) issued an order regarding the remaining issues in dispute after the collaborative sessions to determine Illinois Plan of Record (POR). Regarding Disputed Issue 6 OSS System Interface Availability, Ameritech Illinois (AI) was required to "finalize its analysis of the maintenance requirements of its pre-ordering interfaces and to reports its findings to the Commission Staff and the CLECs within one (1) month after the adoption of this Order" (p. 49). This report contains the findings of that analysis including evidence supporting AI's assertions regarding synchronization of the hours for pre-order functionality to the offered hours for ordering (6 a.m. to 1 a.m. central time).

Pre-ordering is by nature fundamentally an interactive, real-time activity. A pre-ordering transaction is essentially an inquiry for information residing in an AI system database. Ordering is, however, a less real-time activity. CLECs prepare orders using their system(s) and transmit them for processing by AI. This has made it possible for AI to extend the availability of its ordering *interfaces* by adding to the availability hours of its front-end applications and queuing orders where and when backend systems in the processing flow are unavailable.

The fundamental processing paradigm of pre-order requires that all systems within the processing flow must be simultaneously available in order fulfill a request for pre-order information. While extended availability of the front-end *interfaces* is possible, the analysis conducted confirms the large data stores and complex systems necessary to support the *backend* pre-ordering functionality at AI require a level of maintenance that makes synchronization of the hours for pre-order functionality to the offered hours for ordering infeasible with the current systems and architecture.

The backend systems and architectures used by AI are primarily based on large-scale mainframe processors. These processors do require significant overhead and maintenance yet are also still considered an appropriate and technologically sound choice for processing large amounts of data with speed and reliability. The maintenance activities required on these platforms are explained in Appendix A: Explanation of Routine and Special Maintenance Activities.

In pursuing alternatives related to extended pre-ordering availability, various options are able to be assessed:

1. Adjusting, rescheduling and synchronizing maintenance schedules of the backend systems. This technique was used to offer the 8 hours of AI pre-order availability on Sunday. Costs involved in this process were for manpower efforts in the study, coordination and communication of adjusted schedules. No maintenance activities were compromised or eliminated that are required to maximize system performance and reliability. No hardware or software expenses were incurred.
2. Provisioning of duplicated (i.e. mirrored) systems. While this option is technically feasible for some mainframe systems, the increase in costs and overhead are tremendous and not justifiable. This type of effort would entail large personnel, facilities, hardware and software

expenditures that are estimated in the tens of millions of dollars even to address a handful of systems.

3. Rewriting or re-hosting of systems on to architectures and platforms that require less maintenance activities. This option may not be technically feasible. The large data stores and complex processing required to support AI retail and wholesale needs with reliability and high speed of response may not be supportable on architectures and platforms less robust than the mainframe technologies currently used. The cost of this approach increases exponentially over the other options. Cost estimates for this alternative can reasonably be estimated to approach one hundred million dollars.

AI considers the pursuing of option 1 above the only reasonable alternative to achieving extended hours of availability. AI plans to continue to pursue this course of action in order to meet the ICC's order to "set out a plan expanding pre-ordering availability for an additional eight (8) hours to its weekly schedule (above and beyond the eight (8) Sunday daytime hours ordered above)" (p. 50). AI will approach this effort on a function by function basis and align these additional hours with the hours offered for ordering. The cost burden of the other options is solely for the benefit of CLECs and far exceeds the obligation of AI to provide non-discriminatory access to pre-order functionality.

2 Ordering and Pre-Ordering Paradigm Overview

2.1 Ordering Services

Figure 1 depicts the ordering paradigm used to process CLEC orders.

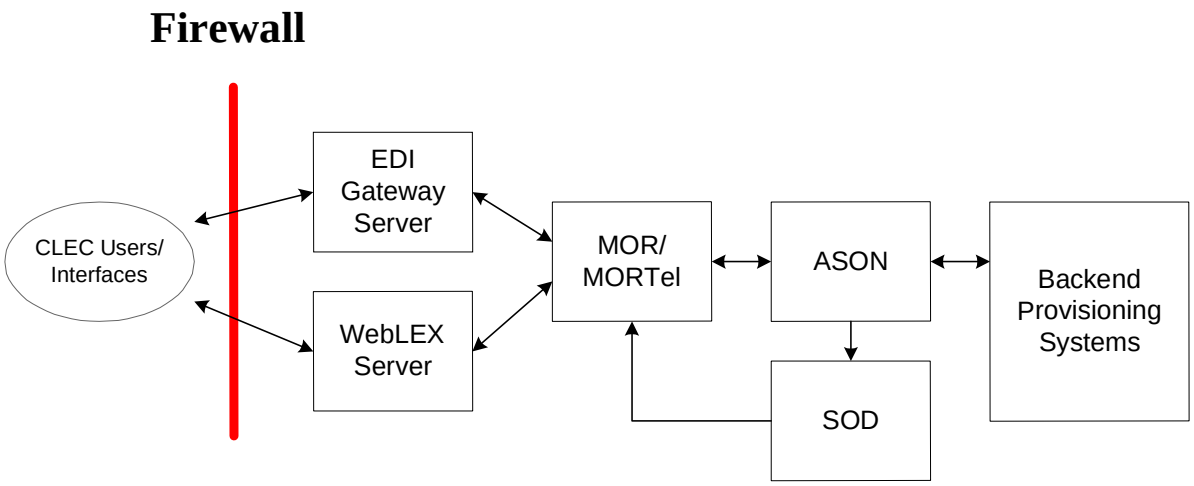


Figure 1

AI provides access to ordering processes through interfaces (EDI and WebLEX) to its wholesale ordering gateway (MOR/MORTel) and on to the retail and wholesale service order processing system ASON. ASON then sends orders out of the ordering flow into the AI backend provisioning systems. The SOD system is used to pass completions back into MOR from ASON.

Processing of incoming orders and outgoing CLEC notifications, is event driven. As activities in one system occur, they trigger the next system in the processing "chain" to act by placing information into a queue to be processed by the next system. Each system can act independently from the next because they monitor their queues for incoming work and place outgoing work in a queue for the next system. These queues are a necessary and efficient mechanism to ensure that orders are not lost and that no single link in the "chain" impacts AI's ability to accept and respond to new work from CLECs.

The hours offered to CLECs for ordering are for the *interfaces* (EDI and WebLEX) only. CLECs requested availability of the ordering interfaces beyond the window that supports full processing of LSRs. Because of the event driven architecture, AI was able to agree to this request. LSRs are not processed during the entire ordering availability window. They are processed only during the hours of availability for ASON and therefore at parity with AI's retail operations.

2.2 Pre-order Services

Figure 2 depicts the pre-ordering paradigm used to process CLEC pre-order transactions.

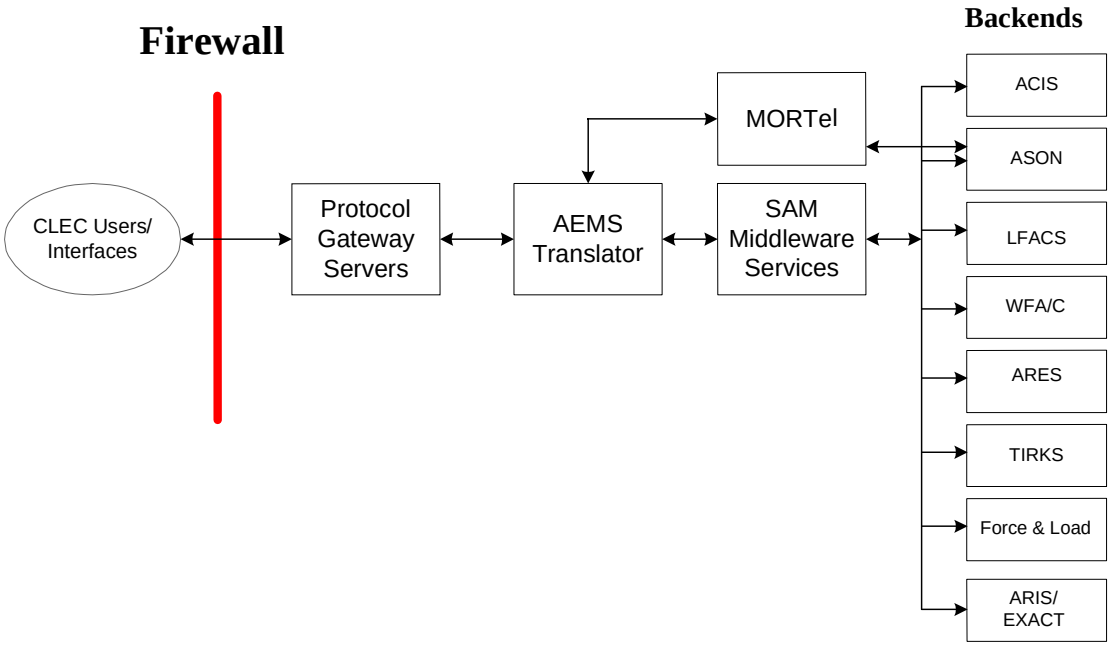


Figure 2

AI provides access to pre-order information through interfaces to its core backend systems. A CLEC pre-order transaction must be processed real-time from receipt of the request, through the appropriate interfaces that direct the request to the appropriate backend system hosting the information, and then return the information back to the CLEC in a matter of seconds.

The computing process to satisfy a CLEC pre-order request works like a "chain" of systems that are linked together. If one of these systems should be unavailable, then the processing "chain" is broken and the flow of information cannot be completed. The ability to provide information in response to a CLEC pre-order request requires end-to-end availability of all systems involved in the processing of that request, which typically includes the interface, middleware, midrange data bases, and backend systems.

Each pre-order request requires the availability of the Ameritech Enterprise Messaging System (AEMS). This system receives the EDI pre-order request and translates the EDI format into a request for information. Depending on the specific pre-order request, AEMS then forwards the pre-order request to either Service Access Manager (SAM) to obtain information from the appropriate backend system or to the MORTel data base to extract information directly.

SAM is AI's middleware and is used as a common linkage product to access the appropriate core backend system to acquire the requested information. The SAM infrastructure is also utilized for some of AI's retail information requests.

Some pre-order information is accessed from midrange computer data bases in the MORTel system in order to shorten the CLEC response time. MORTel is updated periodically with information from the backend systems. The use of MORTel is appropriate only for non-volatile, low volume information.

The source of pre-order information, whether accessed through SAM or loaded into MORTel data bases, is AI's backend systems. There are many different backend systems. Each has a different business purpose and maintains different information in its databases that is relevant to pre-ordering. Most pre-order functions require access to multiple backend systems. These are the same backend systems that support AI's retail operation. It is transparent to these backend systems as to whether they're processing CLEC transactions or retail transactions.

3 Pre-Order and Ordering Synchronization

The diagrams and explanations above demonstrate the fundamental differences in the processing paradigms used for pre-order and order. The ordering architecture allows for LSRs to be held within the processing "chain" until backend systems become available. The pre-ordering architecture cannot allow the transactions to be held or the "chain" to be broken. Responses must be received within seconds of the submission of the request.

This basic difference explains why AI has more flexibility in the hours offered for ordering than pre-order. Ordering does not have to be dependent on the backend maintenance schedules only the front-end *interface* maintenance schedules. This difference is reflected in the POR language for hours of availability for Ordering:

"… will expand the hours when and LSR sent to Ameritech Illinois will be held for processing. … If backend systems are not available during any of this period, LSRs will be held and then processed when the backend systems become available" (IL POR Section H)

CLECs requested availability of the ordering interfaces beyond the window that supported full processing of LSRs. AI agreed to the extended hours because it did not entail making adjustments the backend systems or maintenance activities.

AI cannot support the same hours for pre-order functionality because unlike ordering, offering of the *interfaces only* provides no value to the CLECs. AI will continue to pursue adjusting, rescheduling and synchronization of maintenance schedules for the backend systems that support pre-order functionality in order to meet the ICC's order to "set out a plan expanding pre-ordering availability for an additional eight (8) hours to its weekly schedule (above and beyond the eight (8) Sunday daytime hours ordered above)" (p. 50). AI will approach this effort on a function by function basis. This will likely result in different hours of availability for each of the pre-order functions (similar to the approach used at Verizon – New York). This approach will allow CLECs additional functionality for some pre-order functions that will be more closely aligned with the hours offered for the ordering interfaces.

4 Detailed Review of Pre-Order Backend Systems and Maintenance Activities

The following matrix outlines the interface, middleware and backend systems necessary to provide pre-order functionality.

System Name	Business Function Related to Pre-Order
AEMS	Interface to receive/return pre-order CLEC transactions
SAM	Middleware access to backend system information
MORTel	Information copied from backend systems for carrier availability and feature availability; architectural component for most pre-order functions
ACIS	Backend System; customer service record (CSR)
ASON	Backend System; address validation, telephone number assignment, working telephone number information, due date
LFACS/FACS	Backend System; DSL loop qualification, due date, working telephone number information
WFA/C	Backend System; order status information
ARES	Backend System; DSL loop qualification
TIRKS	Backend System; connect facilities available (CFA)

Force & Load	Backend System; due date for specials
ARIS/Exact	Backend System; network channel information

4.1 System Maintenance

All of the systems listed above required various forms of maintenance in order to keep them running efficiently and reliably. The specific maintenance activities, the frequency, and the magnitude of time required will vary from system to system. Not all types of maintenance activities preclude a system from being available for pre-order services. Within the context of this document, just those that activities that preempt pre-order availability will be addressed.

Maintenance can be generally classified into two categories: maintenance that is scheduled periodically (e.g., daily, weekly, monthly, quarterly, etc.) and special maintenance activities that are scheduled on a non-recurring basis. The maintenance activities required on the systems above are explained in Appendix A: Explanation of Routine and Special Maintenance Activities.

Periodic maintenance activities are predictable and are regularly scheduled (i.e., data base backups, data base re-organizations, application releases, etc.). Much of the periodic maintenance is oriented on efficient management of information data bases. Key factors that predicate the duration and frequency of the periodic maintenance are the size and volatility of the data base. This data base maintenance is preventative in nature, performed to promote reliability, recoverability, and efficiency in its access. Application releases provide enhancements to the system logic and functionality. Application releases are performed on scheduled weekends, and typically entail extensive testing after being implemented to verify the system functions as required.

Maintenance scheduled on a non-recurring basis is typically event driven (i.e., hardware installs/upgrades, system software upgrades, problem resolution, etc.). The non-recurring maintenance activities are often major events, requiring elongated system unavailability. Examples of non-recurring maintenance activities include replacement or upgrade of computing hardware to provide capacity for transaction volume growth, installation of new releases of system software, and hardware or storage maintenance activities based on monitoring of performance trends. Each of these can typically be scheduled with advance notice. However, there may also be occasions where problems (e.g., hardware component failure, severe performance degradation, etc.) must be addressed immediately, without significant advanced planning.

Scheduled periodic maintenance activities represent “normal” recurring system upkeep tasks that define limitations on when a system can be made available. Non-recurring maintenance activities are incremental to periodic maintenance and treated as planned “exceptions” to scheduled system availability. Periodic maintenance defines the hours during which pre-ordering can be made available; non-recurring maintenance identifies how often that availability may be have to be preempted.

4.2 CLEC Pre-Order Interfaces Maintenance

The periodic hardware maintenance requirements for CLEC pre-order interfaces AEMS (version Issue 7, EDI & TCNet), AEMS (version LSOG4, EDI and CORBA), and Web Verigate (LSOG4) can support extended availability. Each has periodic maintenance requirements, but by their nature of being interfaces, they are not information storage intensive systems requiring extensive time. These activities can typically be accommodated during a four to five hour nightly period allowing for synchronization with the offered hours for ordering.

Periodic application release implementations are required for each of these interfaces as dictated by the Change Management Process (CMP). Application releases are implemented on the weekends and require pre-order services to be unavailable during the application release installation and testing. The number of occasions that application releases are required varies. Releases are scheduled and allow for appropriate notification to CLECs.

These interfaces also require non-recurring maintenance. These activities are also performed on weekends and since they're often major maintenance events, preempt pre-order availability. The duration and frequency of these events can't be accurately predicted. These events are scheduled and allow for appropriate notification to CLECs.

4.3 SAM Middleware and MORTel Maintenance

The periodic hardware maintenance requirements for MORTel and SAM can typically be accommodated during a four to five hour nightly period allowing for synchronization with the offered hours for ordering. SAM's periodic maintenance may encroach on the window on as many as 8 occasions during the year. Any exceptions to the availability due to the periodic maintenance would be communicated to CLECs in advance or counted as downtime.

Periodic application release implementations are also required for MORTel and SAM. Application releases are implemented on the weekends and require pre-order services to be unavailable during the application release installation and testing. The number of occasions that application releases are required varies. Releases are scheduled and allow for appropriate notification to CLECs.

MORTel and SAM also require non-recurring maintenance. These activities are also performed on weekends and since they're often major maintenance events, will preempt pre-order availability. The duration and frequency of these events can't be accurately predicted. These events are scheduled and would allow for appropriate notification to CLECs.

4.4 Backend Systems

Because each of the backend systems has different maintenance requirements, each will be addressed separately indicating whether they can or cannot normally support extended

availability which matches the hours offered for ordering. See Appendix B: Graphical Representation of Pre-Order Functionality Availability for a matrix outlining the hours that can be supported by each of the backend systems.

It is AI's backend systems that limit expansion of pre-order availability. Since the backend systems support both the CLEC and AI's retail business information needs, the limitations apply equally.

Additionally, AI's backend systems, while often reflecting an older architecture, are not inherently less efficient than the newer CLEC interfaces. The preponderance of maintenance that is required by the backend systems is related to data base efficiency and reliability. The AI backend systems by design support the vast data stores that are required to support the local exchange. Large, volatile data stores precipitate significant maintenance activities with extended processing times.

4.4.1 ACIS – Customer Service Record (CSR)

ACIS can support extended availability during the weekdays but cannot on the weekends. ACIS is an information intensive system with large, very volatile data bases that require weekly maintenance which is scheduled on the weekends. The ACIS-Illinois data base maintenance is performed in four concurrently executing streams of image copies/reorganizations. However, it still requires up to 8 hours of processing to complete. This particular maintenance activity requires the computer to be operational, but precludes access to the data bases, so all other maintenance that may be performed on ACIS on a given weekend is incremental to this period. Examples of the other maintenance scheduled periodically on various weekends include monthly application releases (approximately 18 hours per month), other system maintenance (approximately 2 hours weekly and an additional 4 hours quarterly), Central Processing Unit (CPU) hardware/operating system maintenance (approximately 4 hours performed 8 times annually), and storage system maintenance (approximately 8 hours quarterly). Several hours of application work is also performed on the weekend to perform mass changes or extracts from the data bases.

In addition to this, there will be occasions when non-recurring maintenance is required to be performed, and must be integrated with the scheduled periodic maintenance.

4.4.2 ASON – Address Validation, Telephone Number Assignment, Working Telephone Number Information and Due Date

The periodic maintenance requirements for ASON can typically support the extended hours of pre-order availability that synchronizes with the hours offered for ordering. There are exceptions on weekends when applications releases and non-recurring hardware maintenance is required. These occasions could be as often as monthly but are planned in advance and allow for notification of the exception to the CLECs.

Address information is a function CLECs have indicated is important to their LSR processing. AI will make this function available to CLECs in synchronization with the hours offered for ordering with exceptions communicated in advance as dictated by the release and non-recurring maintenance referenced above.

4.4.3 LFACS/FACS – DSL Loop Qualification, Due Date and Working Telephone Number Information

LFACS/FACS can support some extended availability during the weekdays but cannot on the weekends. This is an information intensive system requiring weekly data base maintenance. Backups are taken six nights each week (Sunday – Friday) taking three to four hours of processing for each backup. Typically two weekends per month are required to install application releases and perform other data base maintenance, such as reorganizations and re-sizing. The duration of these activities normally exceeds the daily four to five hour window allowed for maintenance that synchronizes with hours offered for ordering.

4.4.4 WFA/C – Order Status Information

WFA/C can support extended availability during the weekdays but cannot on the weekends. The weekly image copies for WFA/C require six hours to complete on the weekend. The processing of these activities is scheduled in coordination with the availability of other Network systems. On some occasions this image copy work is moved to Thursday night to avoid conflicts with other system work or application releases scheduled on the weekend. WFA/C is also required to be down for other operating system, data base and tool maintenance for up to eight hours, during major application releases that occur twice per year and during NPA Splits.

4.4.5 ARES – DSL Loop Qualification

ARES cannot support extended availability that matches the hours offered for ordering during the weekdays or on weekends. Image copies are taken daily and require six hours of processing. ARES supports other complex Network business functions in addition to loop qualification. The support of these functions contributes to the need for extended maintenance activities. In addition to image copies, other maintenance activities are performed on some weekends, including software loads, application releases, data migration, and data updates, which may require up to an additional eight hours of maintenance processing which preempts pre-order availability to retrieve loop qualification information.

4.4.6 TIRKS – Connect Facilities Available (CFA)

TIRKS is a high availability system that is available 149 of the 168 weekly hours. This allows TIRKS to support extended hours of availability during the weekday hours that match the hours offered for ordering but not on the weekends. The window between 5 p.m. Saturday through noon on Sunday is required to handle the batch workload for system maintenance. Additionally, this downtime for TIRKS is coordinated with other Network systems, to provide continual access to critical network information. Application releases and non-recurring hardware maintenance must not only integrate with the TIRKS schedule, but also availability across other Network systems.

4.4.7 Force & Load – Due Date for Specials

The periodically scheduled maintenance for Force & Load can be accommodated without impacting the ability to process pre-order requests. The system would be unavailable only due to application releases or non-recurring hardware maintenance activities. These are planned activities and these exceptions can be communicated in advance to CLECs.

4.4.8 ARIS/Exact – Network Channel Information

ARIS/Exact has approximately 50 data bases that required weekly maintenance on the weekends. The maintenance activities have been streamlined to run as concurrently as possible. However, some of the individual data bases activities require up five hours of processing. The added time to take the system down and back up cause ARIS/Exact to exceed the four to five hour nightly window allowing for synchronization with the offered hours for ordering.

When other system maintenance is required, it could not be accommodated with the data base maintenance work. Application releases and non-recurring hardware maintenance would be incremental to these periodic maintenance activities.

Appendix A: Explanation of Routine and Special Maintenance Activities

Data Base Re-Organization (re-org): Information on a database is recorded on physical location on the disk's surface in a sequence based on the key information attributes. (e.g., a data base organized by telephone number) As updates are made to a disk database, the addition, deletion, and updating of records is performed in a supplemental "work" area of the disk. A new or modified data base record is written to the disk and can be accessed in this work area for further review or updating. However, physically, the record will not be found on the disk in the original logical sequence. Access to database records then requires not only reading where the record belongs logically, but also reading the work area for updated records. The more data that is stored in the work area, the more reads will be required to retrieve information. These extra reads in the disk's work areas then consume additional time. Additional reads to access information are then an inefficiency that is seen as degraded response time to perform a function on the database. Similarly, when a data base record is deleted, it is logically removed and is no longer accessible, but the bytes of information will continue to still occupy the same physical location on the disk making this space unavailable for use.

The purpose of the disk re-org maintenance activity is to physically re-write and re-arrange the data base to place all the records in their logical sequence, re-capture space from deleted records, and clear the work area for future updating. The more volatile a data base is, the more important the re-org would be for efficient access, and the more often it would be performed. The larger the size of the data base, the more time it would take to be performed. This is why the storage maintenance activities on AI's information intensive legacy systems take much longer than the CLEC interfaces.

Database Image Copies: A database image copy is a maintenance activity that employs utility software to copy the information resident on the database to another physical media, which is quite often magnetic tape. This is performed on a regular basis as a safeguard against the potential of data corruption (i.e., virus, system error, etc.) or physical destruction (i.e., hardware malfunction, physical disk destruction, etc.). The image copy media can be used to re-establish the database to the point in time that the image copy was taken. Some Image Copy media versions are stored in other locations to facilitate recovery of information in the unlikely event of an entire site being destroyed. The frequency of image copies is largely dependent on the volatility and importance of the database's information.

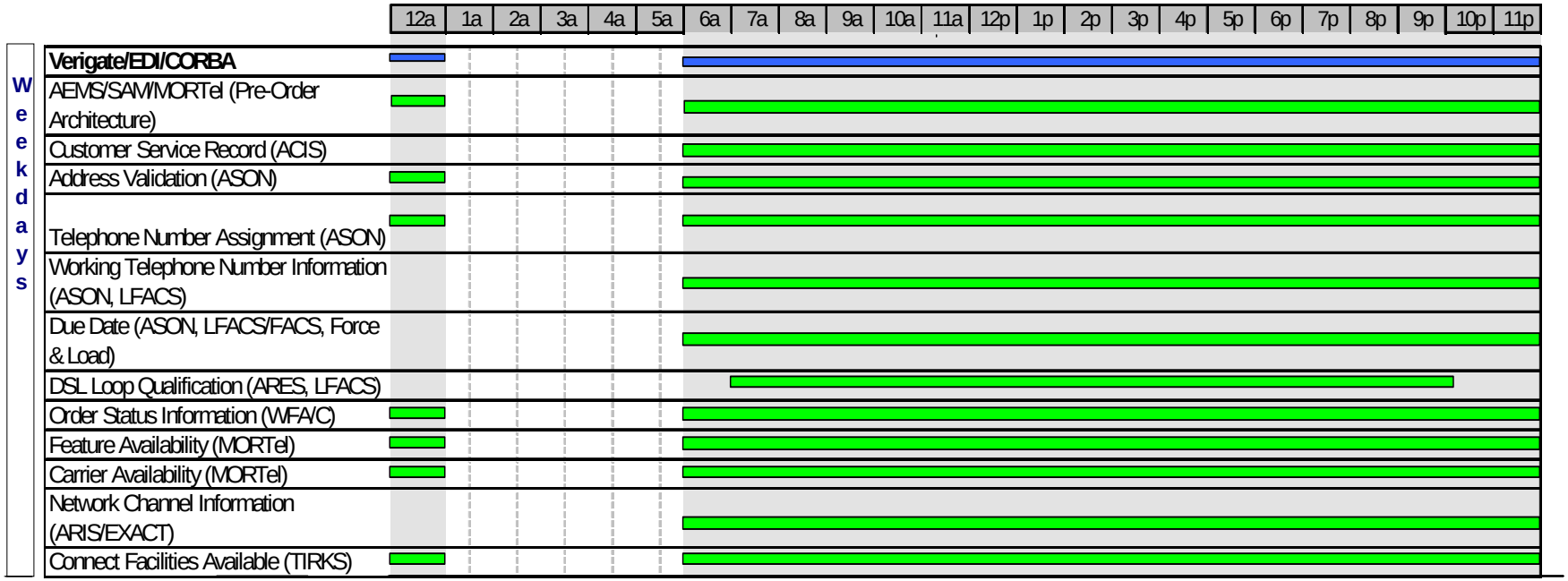
Central Processing Unit (CPU) Maintenance: This is maintenance performed on the actual computer central processor. The mainframe computers are taken down, and re-initiated on a periodic basis. This is referred to as an Initial Program Load (IPL). This IPL accomplishes many tasks including items like clearing fragmentation of core memory, implementing fixes, patches, and upgrades to the operating system software received distributed by the software vendors, defining new devices to the system (e.g., new disk drives). There are also less frequent occasions where a longer period of time is required to perform tasks like upgrading hardware components (e.g., physically adding memory or storage to an existing CPU) or re-configuring the

computer alignment into logical partitions (LPARs). The CPU maintenance activities listed above is not an exhaustive list, but are examples of typical obligations.

Database 'Scrub': A database 'scrub' refers to the use of a coded or utility program to apply appropriate updates to a large number of records (e.g., accounts) on a database. There is often some characteristic in the record that determines if the update should be applied to a specific record or not. For example, 'scrubs' are used to designate customer accounts as being eligible for the Municipal Infrastructure Maintenance Fee (IMF), as their municipalities enact IMF charges. A scrub with this purpose would then update just the records in that particular municipality. The use of a 'scrub' to make a mass change is far more efficient than if service representatives were required to update each account individually through on-line updates. Mass change updates made through scrubs are much less prone to error due to the chance of human error in updating. A 'scrub' requires exclusive use of the database, so it cannot be performed when the systems and database are available for other purposes. 'Scrubs' are scheduled on the weekends to minimize disruption to business functions.

Application Release Implementation Activities: Enhancements to functionality of AI's applications (e.g., programs) in a system are applied concurrently in what is referred to as an 'application release'. An application release generally involves replacing the existing version of program logic with a new version containing enhancements. Examples of enhancements made to programs are introduction of regulatory mandates, logic for new products, and modifications to business functions. Application releases require that the system not be available for other purposes until the installation is completed and the new programs have been regression tested a final time to ensure they are functioning correctly. Application releases often require that coincidentally 'scrubs' be performed. For instance, if new a new business function requires storage of additional information in a database, a 'scrub' may be require to expand a record's size to accommodate new information. For AI's ACIS system, application releases have ranged from 14 to 23 hours, with average being 19 hours. This application release time is required in addition to other forms of system maintenance, such as those described above.

Appendix B: Graphical Representation of Pre-Order Functionality Availability



All times listed are Central Time

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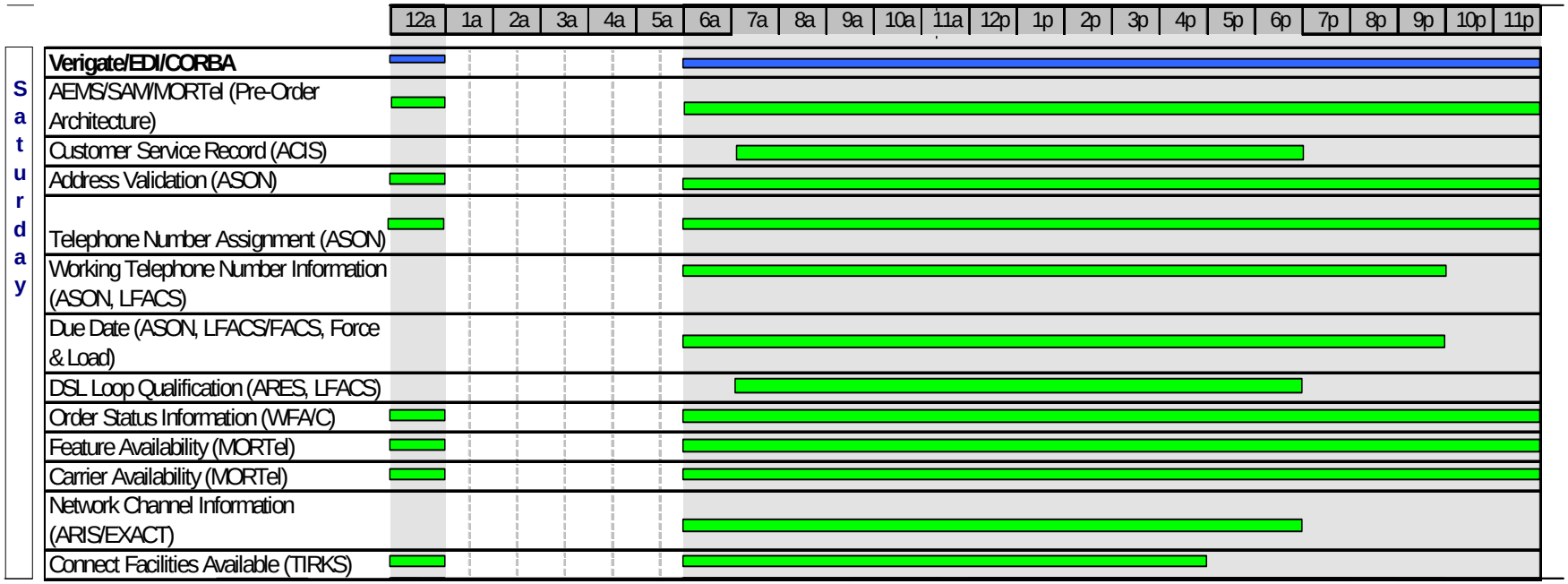

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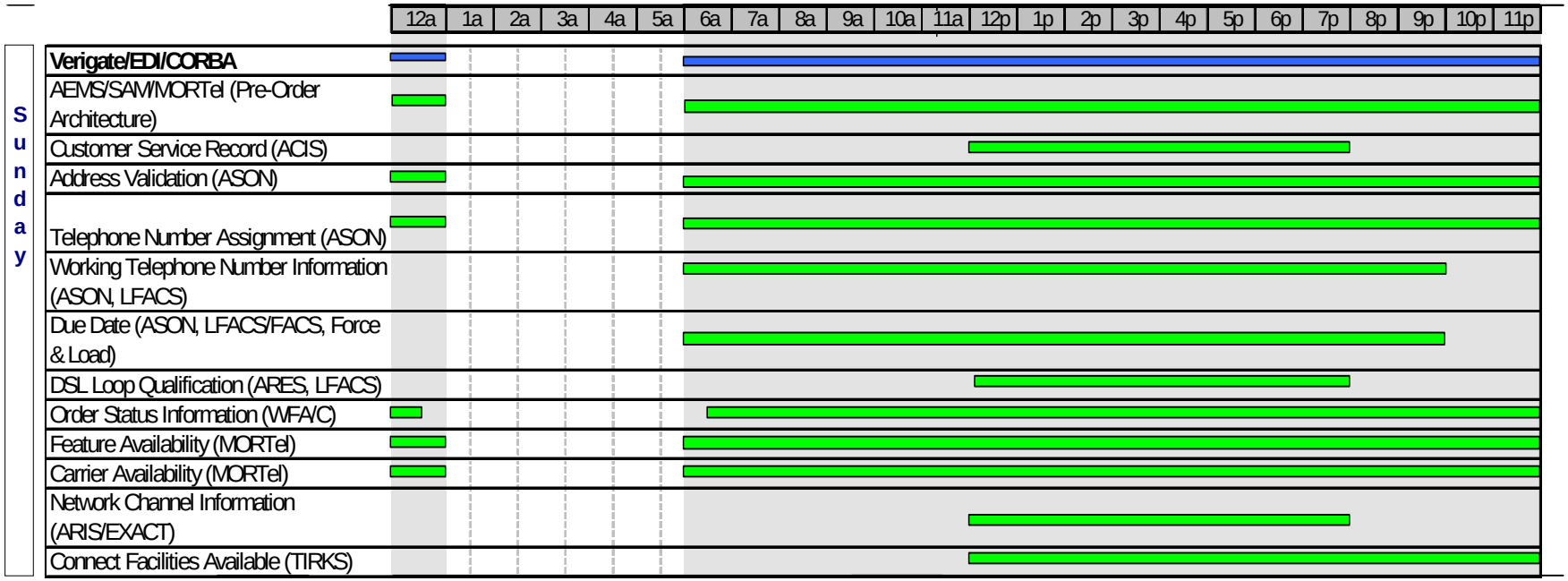

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